Space Weather Forecast

Issued on Tuesday, 19 April 2022 at 13:03 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate-class X-ray flares likely throughout (R1/R2 Radio Blackouts).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with a low-end moderate-class X-ray flare observed from a now-departed highly productive sunspot region on the southwestern horizon of the sun at 18/1724UTC. This was followed by a similar-magnitude X-ray flare from one of the large surviving sunspots in the northeast at 19/0450UTC. There are now up to five front-sided sunspot regions, with the northeastern quarter harbouring at least two and perhaps three large regions. One of these has produced continuing occasional Moderate-class activity with another going through a similar phase over the UTC Easter weekend, peaking with a strong-class prior to this 24 hour period at 17/0331UTC. Now adding to these groups is another new region arriving, perhaps not fully reveal yet by at least appearing as a large unipolar spot. The other two sunspots on the Earth-facing side were both unremarkable, with steady or decaying trends and with no significant flares being generated.

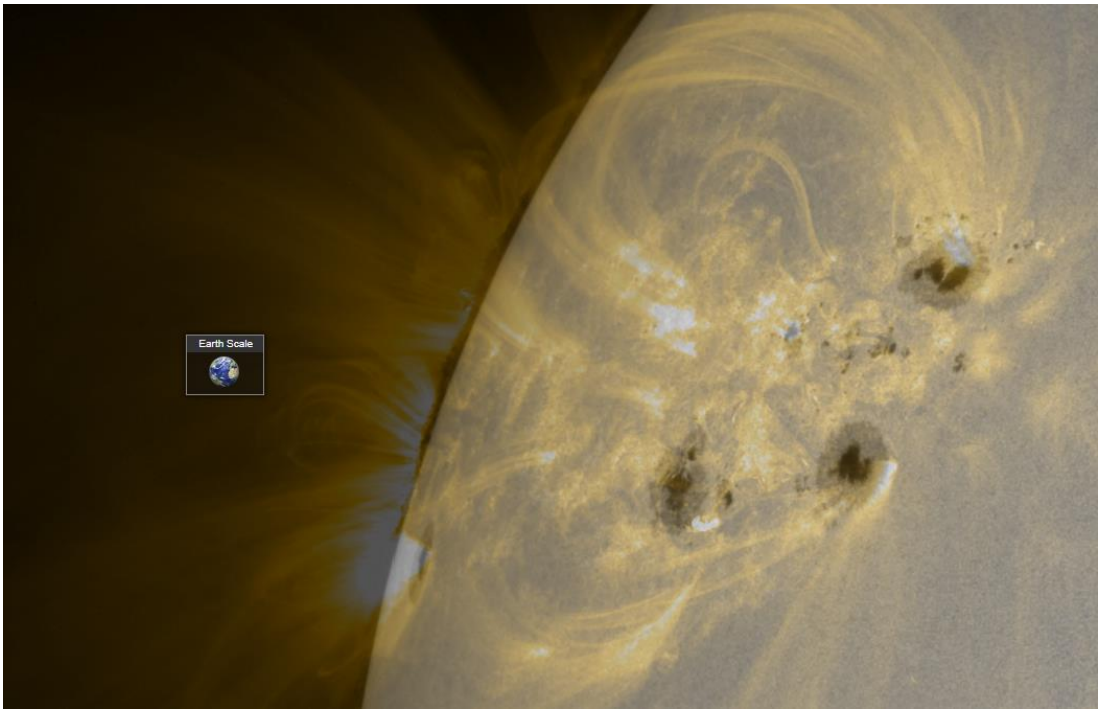

Figure 1: 19/1100UTC visible and false-colour extreme UV images overlaid, showing the current active northeastern part of the sun, possible upcoming regions over the horizon, and the Earth to scale. Image processing courtesy of Helioviewer.org.

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A Coronal Mass Ejection (CME) seen heading mainly westwards on morning satellite imagery appears to be far-sided from cursory analysis, meaning that there was no evidence of any Earth-bound CMEs in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind showed declining fast wind characteristics from a mature connection to a coronal hole. The solar wind speed fell from early elevated levels to become slightly elevated by the end of the period. The number of particles comprising the solar wind and their magnetic field were both small-scale over the same period.

The net result of the above solar wind measures was provisionally mainly quiet, well below Minor Geomagnetic Storm G1.

Energetic Particles / Solar Radiation: No solar radiation storms were observed in the period.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be moderate over the next four days, coupled with a daily slight chance of strong-class flares, mainly from the regions currently in the northeast of the sun. No further sunspot regions leave the Earth-facing side in the period, whereas the northeast may be added to. The trend in risk is therefore level or potentially upward, TBC when any spots manifest over the eastern solar horizon.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs in the forecast.

The current fast wind has now likely peaked, and the chances of Minor Storm G1 before midweek UTC are now very low. A second stream of fast wind may then connect with the Earth on 21 April, leading to a peak slight chance of G1/Minor Storms on day three, 21 April, with an otherwise quiet outlook.

Energetic Particles / Solar Radiation: Solar radiation storms are not expected, although there is a very gradually increasing risk as the most complex sunspot regions rotate westward with time.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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